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THE DEMAND FOR MONEY IN EEC COUNTRIES

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This paper examines the demand for money in the EEC countries and is focussed on five issues. First it starts from a common economic framework, which allows for shifts from $M\,2$ to non-money assets and *vice versa*. Second, special attention is given to the dynamic structure of the statistical model in order to obtain meaningful conclusions on, e.g., the speed of adjustment of actual to optimal money holdings. Third, the study is entirely based on a uniform set of quarterly data for the eight countries concerned. Fourth, the paper presents a careful examination of the residuals and, finally, analyses the predictive behaviour of the estimated models. For all countries we found long-run income elasticities greater than unity and interest rate elasticities clustered around −0.20. The impact of inflation and the business cycle variable appeared to be significant in the majority of countries considered.

1. Introduction

This paper focusses on the demand for money in the EEC countries. The relationship between money balances and their determinants has been studied extensively during the last decade, and several surveys portray the state of affairs for single countries [see, e.g., Boorman (1972), Fase and Kuné (1975), Goodhart (1975), Laidler (1977)]. There is ready agreement on the view that the knowledge of the demand for money function is important for the formulation of an appropriate monetary policy. Or as Boorman (1972, p. 250–251) remarks:

> 'The stability of the money demand function, together with a capacity on the part of the monetary authority to influence closely the stock of assets corresponding to the theoretical concept of money employed in that function would seem to be necessary conditions for the successful implementation of monetary policy.'

A recent descriptive note published by the OECD (1977) indicates that the liquidity concepts applied in the various countries differ, particularly when a broader measure of the money stock is taken. This as well as differences in the particular specification of the demand for money function makes it difficult to compare the estimates among countries.

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These difficulties would hopefully be attenuated if a common methodology were adopted in the estimation of the demand for money function for a set of countries. The present paper purports to do so. This enables us to discover whether there is evidence for a convergence of empirical results, while differences in the estimates obtained must be related to monetary behaviour in the various countries.

Since we started this research at least three studies in the same vein have appeared. Canarella and Roseman (1978) using annual data covering 1957–1972, provide estimates of the narrowly defined demand for money in ten continental European countries and Ireland. On the basis of a common specification they found income elasticities of around one in all the countries considered. Their interest elasticities and speeds of adjustment, however, vary substantially among countries. The estimated equilibrium interest elasticities are between -0.05 and -0.30. The adjustment coefficients also vary, indicating an average lag of between 1.2 and 1.9 years in bringing money balances to their equilibrium level.

In addition to stability Al-Khuri and Nsouli (1978) also examine the speed of adjustment of actual to desired money stock among six major industrialized countries, using quarterly data, which in most cases cover the period 1960–1976. The reported estimates for both *M 1* and *M 2* indicate that with two exceptions the speeds of adjustment for narrow money are not significantly different. When broad money is used the differences are more marked. Both the United Kingdom and Germany have slower speeds of adjustment than the other countries studied. As these estimates result from differencing of the original equation, one should be aware of the fact that this procedure may affect the estimated adjustment speeds.

The question of stability emerges, among other things, also in a study of Boughton (1979). Boughton, using quarterly data for 1960–1976, presents estimates obtained for narrow and broad definitions of money in the major OECD countries. His estimated income elasticities for *M 1* cluster around unity but are uniformly greater than unity when the broad definition is used. The interest elasticities for *M 1* are significant and range from -0.06 to -0.55. This pattern does not differ importantly for the demand functions of *M 2*. A notable but, in view of an earlier study of one of us on the interdependence of interest rates [see Fase (1973)] not surprising finding, is that the interest elasticities do not alter substantially when short interest rates are replaced by long interest rates. As to stability, the study reveals stable demand functions for broad money while instability dominates for *M 1* demands.

This analysis departs from the studies mentioned above in at least five important respects. First, it starts from a common economic framework for the eight EEC countries considered, which allows for shifts from non-money assets to *M 2* and *vice versa*. The importance of this has been recognized by, e.g., Goldfeld (1976) or by Heller and Khan (1979) in their attempt to incorporate the term structure of interest rates in the demand for money function. Second, special attention is given to the dynamic structure of the statistical model, which seems warranted in order to draw meaningful conclusions on the speed of adjustment. This view is supported by recent comments on studies of the demand for money by Hendry and Mizon (1978) and Plosser and Schwert (1978) pointing out the importance of properly specified dynamics of the model, while misspecification due to the modelling of the adjustment lags is also indicated in papers by Laidler (1980) and White (1978). Moreover our modelling of adjustment behaviour goes beyond a simple Koyck-lag, which in view of its restrictive character may be open to criticism. Third, the study is really novel in that it is entirely based on a uniform set of quarterly data collected for this analysis. Fourth, and this is another novelty, the study contains careful examination of the residuals. Finally we investigate the stability of the estimated equations by testing their ability to predict the future course of the money demand in the eight countries considered.

The rest of the paper is laid out as follows. Section 2 discusses the economic framework and statistical methodology underlying this paper. Section 3 describes the data drawn from the countries examined. The estimation results are given in section 4. In section 5 the interpretation of the results is carried further by a closer consideration of the residuals and forecasts of the money stock in the countries considered. In section 6 the conclusions are drawn.

2. Specification and methodology

We postulate the desired nominal demand for broad money, $M2^*$, to depend on expected real income y^*, the expected price level p^*, the expected long-term interest rate r^*, the expected change in the price level p'^*, and the expected level of economic activity c^*. Thus we get

$$M2^* = f(\overset{+}{y}{}^*, \overset{+}{p}{}^*, \overset{-}{r}{}^*, \overset{-}{p}{}'^*, c^*), \tag{1}$$

with expected signs of the partial derivatives as indicated. With the exception of the business cycle, the arguments of (1) are convential and spelled out extensively in the literature. Therefore we do not need to repeat them again. In order to account for cyclical variation in desired money balances — since precautionary motives encourage people to keep larger balances when the level of economic activity slows down — we include the quantity c^* in eq. (1) [see also Fase and Kuné (1974)]. A theoretical justification for this variable may be provided also by arguing that there is substitutability between money or liquidities and commodities, with our cyclical indicator as a simple proxy for the latter. There are several ways of measuring economic activity, and therefore the expected sign of the derivative $\partial f/\partial c$ is determined by this measurement.

The general question may be raised whether one can estimate a demand for money function without also specifying a supply function. Of course, there is a consensus of opinion among monetary economists that theoretically the supply side matters. However, there is also a lot of evidence in the literature going back to the early work of Brunner and Meltzer (1964) or Teigen (1964) that in practice neglecting the supply side does not matter much. Recent research by Laidler (1980) on the exogeneity of the money supply and its implications for the appropriate estimation of the demand for money function suggest that this still seems to stand.

Without much loss of generality we assume (1) to be approximately linear in logarithms. Then

$$\ln M\,2_t^* = \alpha_0 + \alpha_1 \ln y_t^* + \alpha_2 \ln p_t^* + \alpha_3 \ln r_t^* + \alpha_4 \ln p_t'^* + \alpha_5 \ln c_t^*. \qquad (2)$$

The problem with eq. (2) is that the quantities are not observable. Therefore we need to relate them to an observed time series in order to obtain an estimable function. If we assume each variable of (2) to be generated by a linear difference equation of past values, then (2) could be parsimoniously represented by the general multiple regression or, to borrow the terminology of Box and Jenkins (1970), the transfer function model

$$\begin{aligned}\delta(B)\ln M\,2_t = {} & \alpha_0 + \alpha_1\omega_1(B)B^{d_1}\ln y_t + \alpha_2\omega_2(B)B^{d_2}\ln p_t \\ & + \alpha_3\omega_3(B)B^{d_3}\ln r_t + \alpha_4\omega_4(B)B^{d_4}\ln p_t' \\ & + \alpha_5\omega_5(B)B^{d_5}\ln c_t + \theta(B)a_t, \qquad (3)\end{aligned}$$

where $\delta(B), \omega_i(B), \omega_i(B) - i = 1,2,3,4,5$ — and $\theta(B)$ are scalar polynomials in the backward shift operator B, so that $\delta(B) = 1 - \delta_1 B - \delta_2 B^2 - \ldots d_r B^r, \omega_i(B) = 1 - \omega_{i1} B - \omega_{i2} B^2 - \ldots - \omega_{is_i} B^{s_i}$, and $\theta(B) = 1 - \theta_1 B - \theta_2 B^2 - \ldots - \theta_q B^q$; the d_i are integers with $d_i > 0$; and the a_t are stochastically independent random disturbances or white noise. Equivalently (3) could be rewritten as

$$\ln M\,2 = \alpha_0' + \sum_{i=1}^{5} \frac{\alpha_i \omega_i(B)}{\delta(B)} \ln x_{i-d_i} + \frac{\theta(B)}{\delta(B)} a, \qquad (4)$$

where the x_i have the appropriate meaning according to (3). Thus the transfer function is represented by the ratio of two polynomials in the lag operator B.

Obviously the general formulation (4) includes the well-known distributed lag models as special cases. Two examples which have gained popularity particularly among examiners of the demand for money are the partial adjustment and adaptive expectation hypotheses. It can easily be derived that the two hypotheses lead to the following *a priori* specification of the lag polynomials:

$$\delta(B) = (1-\delta B)/(1-\delta), \quad \text{and} \tag{5}$$

$$\omega_i(B) = (1-\omega_i)/(1-\omega_i B), \qquad i=1,\ldots,5, \tag{6}$$

respectively. As to the partial adjustment model, we note that $1-\delta$ is the fixed fraction of the desired adjustment accomplished within one particular time period.

Straightforward application of the techniques of time series analysis to the transfer model (4) may induce differencing of the variables and the noise part which — apart from the noise part — does not make much economic sense. Therefore in this study we follow another, more heuristic approach by consecutively imposing restrictions on the lag functions $\delta(B)$, $\omega(B)$ and $\theta(B)$. In this way the estimations which we finally selected are partly determined by economic plausibility and partly by the data.

3. On the data

As some data required for this analysis were not to be found in published sources, we asked the central banks of the EEC countries to provide us with the relevant quarterly series. Our sample period runs from the beginning of the sixties to 1976:IV and we have 1977:I–1978:IV for *ex ante* prediction, with the exception of Denmark and Ireland where data were not available for this entire period. The resulting data file, set up as uniformly as possible, has the following general characteristics:

- $M2$ —nominal $M2$-data; quarterly averages,
- Y —nominal *GNP* (from Italy, France and the United Kingdom we obtained data on *GDP*),
- p —price deflator *GNP* (*GDP*) with 1970 = 100,
- y —Y/p: real *GNP* (*GDP*) in prices of 1970,
- p' —p/p_{-4} (hence $\ln p'$ is the rate of inflation),
- r —the long-term interest rate; quarterly averages,
- c —(a) a detrended index derived from the supplied data on the business cycle indicator, or (b) the percentage of unemployment [following Fase and Kuné (1974)].

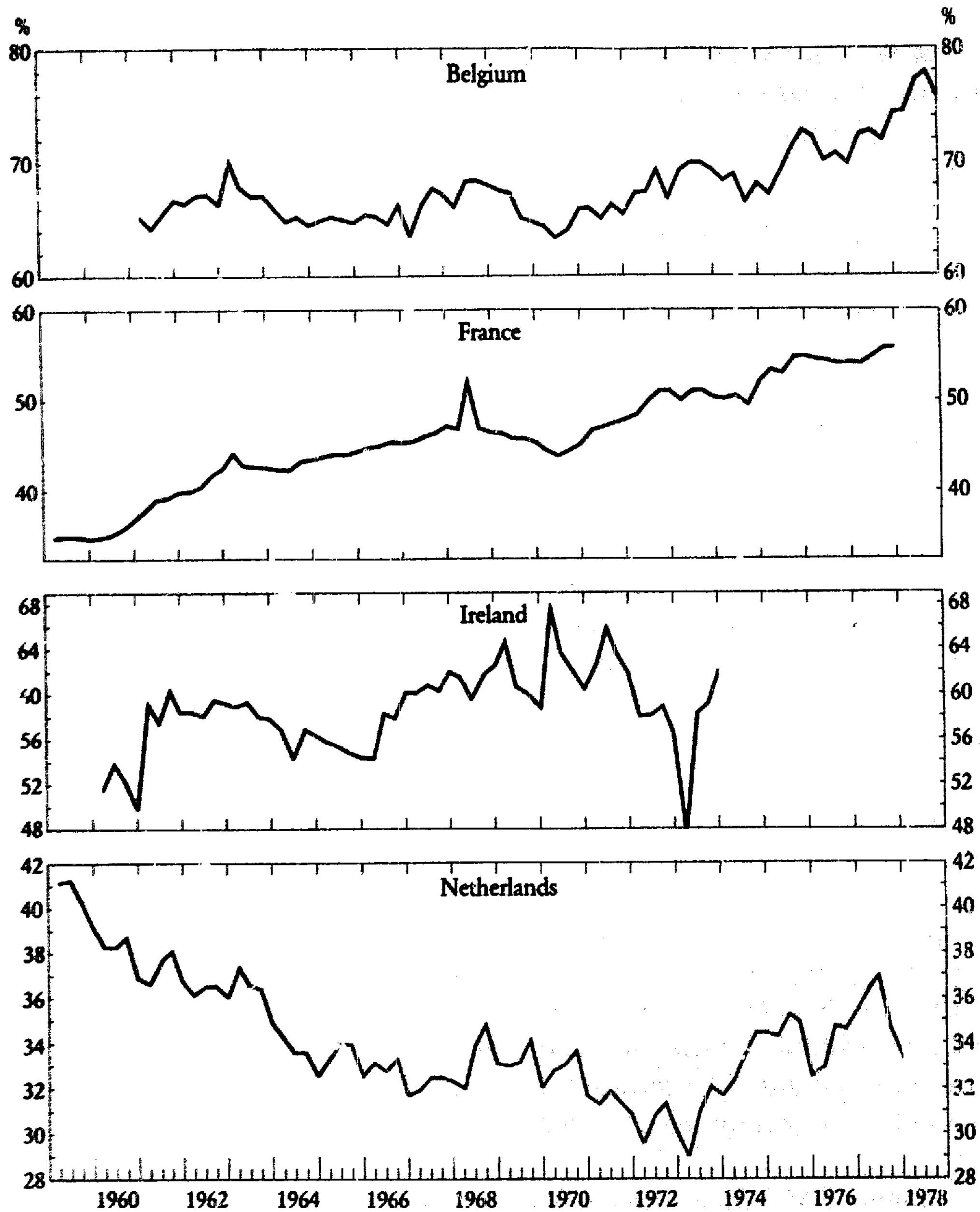

Fig. 1. Liquidity ratio in eight EEC countries.

In view of our preference for unadjusted data in regression analysis [see Lovell (1963), Thomas and Wallis (1971)], the data on $M2$ are not seasonally adjusted. However, for some of the explanatory variables unadjusted data could not be obtained. Therefore we use adjusted data for these variables throughout (apart from the interest rates where no seasonality occurs). The data are given in the appendix.

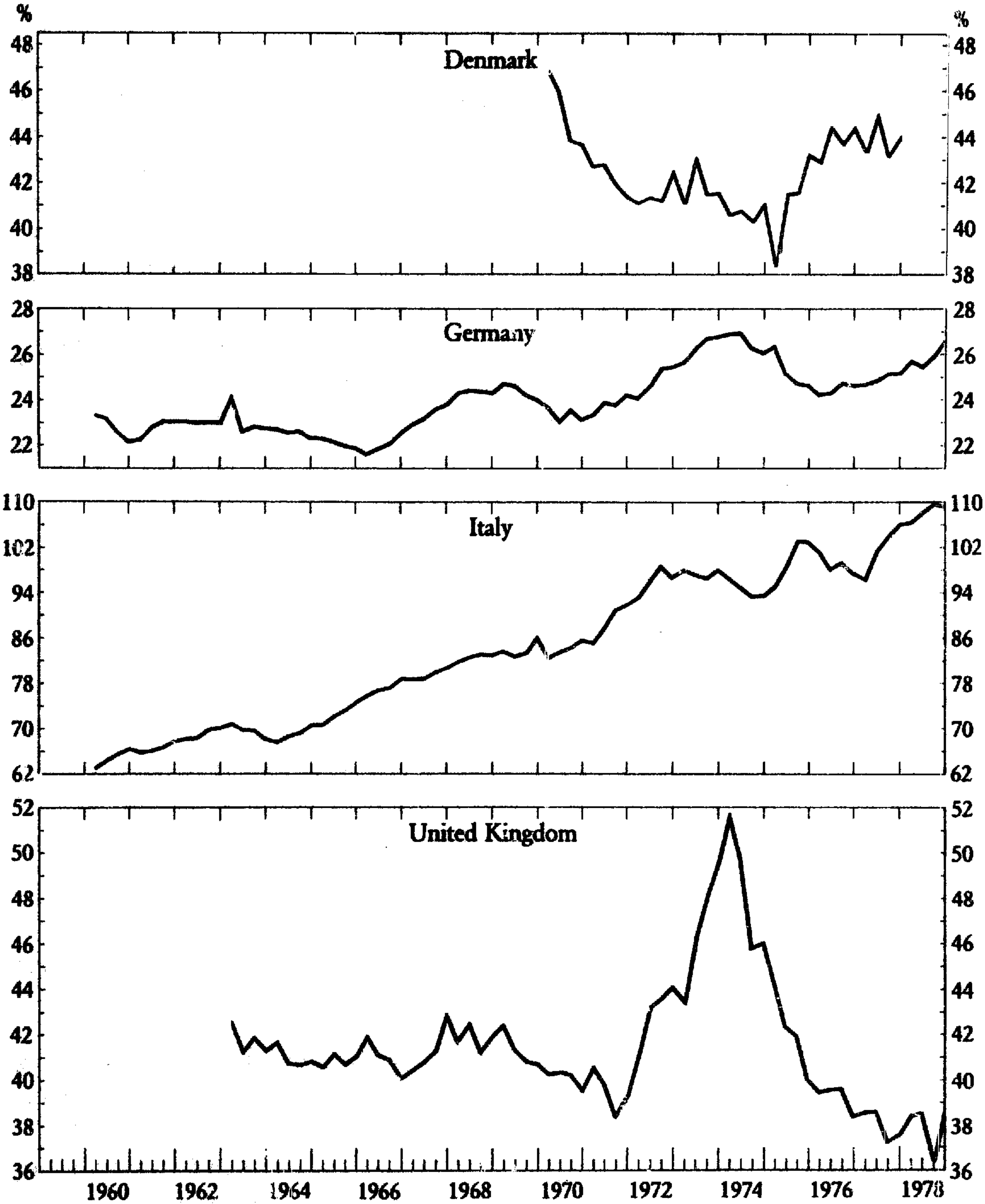

Fig. 1 (*continued*).

As the liquidity ratio or the Cambridge '*k*', i.e., the ratio of *M* 2 *and national income*, plays a crucial role in Dutch monetary analysis, we think it is interesting to consider this quantity for the other members of the EEC as well. Fig. 1 shows the time profile of this quantity for all member countries.[1]

[1]The data on the money stock in the numerator of the ratio depicted in this figure are seasonally adjusted by means of the Census X11 method.

The graphs show a wide range for the values of the liquidity ratio in the various countries. This is partly due to the fact that for all countries we use the national $M\,2$ concept ($M\,3$ in the case of the United Kingdom) rather than the harmonized EEC concept, because the majority of the countries was unable to provide us with a harmonized series long enough for estimation. On the average the lowest values of the ratio are found in Germany while the highest values occur in Italy. This means that the velocity of the $M.2$ circulation, which is the reciprocal of the liquidity ratio, is high in Germany and low in Italy, where nowadays the stock of $M\,2$ even exceeds the GDP yielding a velocity smaller than one.

Both France and Italy show a steadily growing liquidity ratio while the pattern is more complicated in the other countries. Yet, in the majority of the EEC countries the average liquidity ratio has increased in the period 1972–1978, compared with the sixties. Fig. 1 shows for The Netherlands up to 1972 a steadily declining liquidity ratio.

4. Estimation results

4.1. Nominal demand for money

When applying the techniques of time series analysis to the transfer function model (4) no economically plausible results were obtained. Then we proceeded by estimating a function with a more restricted lag structure, *viz.*

$$\ln M\,2 = \alpha_0' + \frac{\alpha_1 \ln y}{(1-\omega_1 B)} + \frac{\alpha_2 \ln p}{(1-\omega_2 B)} + \frac{\alpha_3 B^{d_3} \ln r}{(1-\omega_3 B)}$$

$$+ \frac{\alpha_4 B^{d_4} \ln p'}{(1-\omega_4 B)} + \frac{\alpha_5 B^{d_5} \ln c}{(1-\omega_5 B)} + u. \tag{7}$$

In the above specification every explanatory variable may influence the demand for money by means of its own geometrically distributed lag with $1-\omega_i$ as the speed of adjustment. The respective long-run elasticity is calculated as $\alpha_i/(1-\omega_i)$. We recall from section 2 that this lag structure can be interpreted as an adaptive expectations mechanism. However, if $\omega_1=\omega_2=\omega_3=\omega_4=\omega_5=\delta$ and if the structure of the disturbances is appropriately specified, specification (7) is identical to a specification with partial adjustment of the dependent variable, i.e., to a specification with a Koyck-lag. In that case partial adjustment and adaptive expectations are not distinguishable. It is obvious that without this restriction specification (7) allows for a far more complicated lag structure than the simple Koyck-lag.

Table 1 gives the estimation results for specification (7). All equations are estimated with a constant term and three seasonal dummies.

Table 1

Estimation results[a] for $\ln M2 = \alpha_0' + \frac{\alpha_1 \ln y}{(1-\omega_1 B)} + \frac{\alpha_2 \ln p}{(1-\omega_2 B)} + \frac{\alpha_3 \ln r}{(1-\omega_3 B)} + \frac{\alpha_4 \ln p'}{(1-\omega_4 B)} + \frac{\alpha_5 \ln c}{(1-\omega_5 B)} + \text{seasonals} + u.$

		Real income (y)			Price deflator (p)			Interest rate (r)			Inflation (p')			Cyclical indicator (c)[b]			
Country	Sample period	α_1	ω_1	Long-run elasticity	α_2	ω_2	Long-run elasticity	α_3	ω_3	Long-run elasticity	α_4	ω_4	Long run elasticity	α_5	ω_5	Long-run elasticity	Box–Pierce $\bar{\chi}^2_{12}$ test statistic[c]
Belgium	1961:IV–1976:IV	0.71 (7.69)	0.25 (4.40)	0.95	1.33 (17.79)	—	1.33	−0.20 (6.40)	0.55 (6.08)	−0.44	−0.28 (2.12)	—	−0.28	0.007[+] (1.73)	0.88[+] (8.47)	0.055[+]	13.0
Denmark[d]	1971:I–1976:IV	0.38 (1.73)	0.51 (2.96)	0.77	0.63 (3.22)	0.51 (2.96)	1.29	−0.10 (2.12)	0.52 (2.96)	−0.20	−0.52 (1.84)	0.51 (2.96)	−1.07	—	—	—	18.4
France	1960:I –1976:IV	1.51 (24.24)	—	1.51	1.13 (16.59)	—	1.13	−0.14 (3.47)	0.51 (4.52)	−0.28	−0.29[e] (1.45)	—	−0.29	−0.85 (5.62)	—	−0.85	81.5
Germany	1960:I–1976:IV	0.75 (6.75)	0.27 (3.39)	1.03	1.33 (9.54)	—	1.33	−0.18 (2.00)	0.28 (0.80)	−0.25	—	—	—	0.023[+] (1.34)	—	0.023[+]	61.0
Ireland	1963:I–1973:IV	0.81 (5.33)	0.45 (5.51)	1.46	0.96 (6.19)	—	0.96	—	—	—	−1.28 (2.50)	—	−1.28	−0.36 (1.02)	—	−0.36	30.4
Italy	1962:II–1976:IV	1.41 (18.15)	0.09 (2.12)	1.55	1.30 (31.71)	—	1.30	−0.27 (7.10)	—	−0.27	−0.35 (3.05)	—	−0.35	−0.49 (3.08)	—	−0.49	40.0
Netherlands[d]	1960:I– 1976:IV	0.15 (2.34)	0.84 (14.81)	0.94	0.23 (2.34)	0.84 (14.81)	1.42	−0.06 (2.17)	0.84 (14.81)	−0.34	−0.16 (1.37)	0.84 (14.81)	−0.98	−0.14 (0.31)	0.84 (14.08)	−0.84	24.4
United Kingdom	1964:IV–1976:IV	1.17 (6.38)	0.45 (5.01)	2.13	0.84 (6.04)	—	0.84	−0.13[c] (1.74)	—	−0.13	−0.15[c] (0.48)	—	−0.15	−0.13 (1.37)	—	−0.13	17.9

[a]The figures in parentheses are t-statistics.
[b]A + indicates that unemployment is used as a cyclical indicator.
[c]Corrected for downward bias.
[d]A Koyck-lag is used in the estimations.
[e]Lagged three quarters.

As indicated above, this study considers two alternative trade cycle indicators. We constructed the first indicator in such a way that its expected sign is negative while the expected sign of the second indicator, the percentage of unemployment, is positive. In the regressions we chose the indicator with the best fit, on the understanding that if the outcomes were more or less the same the first indicator would be chosen.

When in the regressions either the coefficient of the interest rate (α_3), of inflation (α_4), or the coefficients of both cyclical indicators (α_5) obtained the wrong sign these variables were lagged up to 3 quarters. In other words we tried for $i=3,4$ or 5: $d_i=1,2,3$. If this still did not yield a coefficient with the correct sign we set α_3, α_4 or α_5 equal to zero and left the interest rate, the rate of inflation or the cyclical indicator altogether out of our regression equation.

When the value of the denominator parameter of an explanatory variable (ω) turned out not to lie between zero and one, or when our iterative estimation procedure did not converge, we set this ω equal to zero and hence estimated no geometrically distributed lag for that variable. In the case of Denmark and The Netherlands the regressions yielded more plausible results with a Koyck-lag than unrestricted estimation of (7) did. Therefore, for these countries we have set $\omega_1=\omega_2=\omega_3=\omega_4=\omega_5=\delta$.

In the last column of table 1 we present the χ^2-distributed values of the portmanteau or Box–Pierce test-statistic. With this test the residuals are tested for white noise and these figures may provide us with a more general check on residual correlation than the D–W-values usually presented in connection with regression results do.

For *Belgium* a most satisfactory equation is found. The coefficients of all explanatory variables obtain the expected sign and are significantly different from zero even though for the coefficient of unemployment as cyclical indicator this is only true at the 10% level. Surprisingly the coefficient of the alternative indicator, the so-called synthetic curve also obtains a positive sign. One would expect these two indicators to be negatively correlated, but they are not. The speed of adjustment with regard to the adaptive expectations appears to be high for real income, somewhat lower for the interest rate and fairly low for the cyclical indicator. The price deflator and the rate of inflation show no clear geometrically distributed lag. We have corrected the break in the *M 2* series in 1969 (see the appendix) by means of a dummy variable which obtains the value of 0.37 (t-value: 23.12) in the regression.

As mentioned before, in the case of *Denmark* inclusion of a Koyck-lag leads to much more economically plausible results than without. It means that by assumption the speed of adjustment is the same for each explanatory variable. We measure an average speed of about one quarter. With the exception of both trade cycle indicators, all variables yield the expected sign, and in spite of the few observations we have at our disposal, the coefficients of the price deflator, the long-term interest rate and the rate of inflation differ significantly from zero at the 10% level.

For *France* a geometrically distributed lag can only be detected for the interest rate variable where we measure an average speed of adjustment of about one quarter. In this equation all estimated coefficients obtain the expected sign and are, with the exception of the coefficient of inflation, highly significant. A dummy with the value of 0.11 (t-value: 4.46) accounts for the revolution of May 1968, when economic activity temporarily dropped, but the money stock remained as its 'normal' level (causing a bump in the liquidity ratio of fig. 1).

In *Germany*, as in The Netherlands [see Fase (1977)] and in the United Kingdom the money stock has been much affected in the seventies by interest rate induced switching between components of $M\,2$ and assets that do not form part of $M\,2$. This switching can be attributed to the unprecedented high levels and the great variability of short-term interest rates. In order to account for this phenomenon two explanatory variables are added to those of (1), namely a short-term interest rate ($\ln r_s$), which is set equal to zero before 1970, and a dummy variable ($\text{dum}\, r_s$), compensating for this break.[2] This procedure showed successful, when re-estimating the Dutch demand for money function of Fase and Kuné (1974). The estimation results for the three countries in question with respect to the term structure are presented in table 2. All coefficients are significant with the expected sign, i.e., positive for the short-term interest rate and negative for the dummy.[3] Namely when the short-term rate is high compared to the long-term rate, switching takes place from non-money to $M\,2$, and *vice versa*. As for specification (7) and the results of table 1, in the German function a distributed lag is estimated for real income and the long-term interest rate. In both cases the adjustment is fast. The influence of unemployment as cyclical indicator is, as expected, positive but not significant and the coefficient of inflation obtains the wrong sign.

In the case of *Ireland* a distributed lag is taken for real income. The influence of the rate of inflation is apparent, whereas the trade cycle indicator obtains the expected positive sign but is not significant. For the interest rate no influence can be found.

For *Italy*, again, we only have a distributed lag for real income with a very high speed of adjustment. The coefficients of all explanatory variables obtain the expected sign and differ significantly from zero.

Like for Denmark, the equation for *The Netherlands* is estimated with the

[2] $\text{dum}\, r_s = 0$ up to 1969:IV and 1 from 1970:I.

[3] In fact we have considered the effects of switching in all our demand for money functions, but only in the case of these three countries it leads to significant coefficients and to an improvement of our estimation results.

Table 2[a]

Estimation results for the nominal demand for money functions with respect to the term structure.

Country	Short-term interest rate ($\ln r_s$)	Dummy ($\mathrm{dum}\, r_s$)
Germany	0.15 (7.44)	−0.30 (6.12)
Netherlands[b]	0.022 (3.34) [0.13]	−0.044 (3.29) [−0.27]
United Kingdom	0.17 (3.91)	−0.35 (4.05)

[a]The figures in parentheses are t-statistics.
[b]Long-run elasticities in brackets.

same distributed lag for each explanatory variable. The estimated average speed of adjustment amounts to $5\frac{1}{4}$ quarter, which is very low compared to the estimates for the other countries. The coefficients of all explanatory variables have the expected sign and, with the exception of inflation and the cyclical indicator, they are all significant at the 5% level.

Finally, in the equation for the *United Kingdom* switching has also been taken into account. It improves the regression in the sense that with inclusion of these variables all other explanatory variables obtain the expected sign. On the other hand, the long-run elasticity of real income now comes out at the almost implausible value of 2.13, which makes our results for this country less satisfactory.

4.2. Real demand for money

Theory on the demand for money takes for granted that the demand for nominal balances is proportional to the price level. From this follows logically that the demand for money function should be cast in real terms. In section 4.1 we investigated this matter directly. By estimating the coefficients α_2 and ω_2 of the price deflator in specification (7) we let the data decide whether the demand for nominal balances varies, *ceteris paribus*, proportional to the price level. From table 1 it appears that, according to our estimations, the long-run price elasticities are significantly larger than unity in Belgium, Germany and Italy. Thus, apart from the fact that the t-statistics might be biased upward (see footnote 6), our results for these countries do not support the economic theory which considers the demand for money is demand for real balances. However, it can be argued that this matter should be studied also by assuming the price elasticity in the demand for money function to be equal to unity. The estimated income elasticities with this case are not expected to differ from our earlier estimates, unless misspecification occurs. In order to investigate this we have estimated a specification with the real $M2$ as dependent variable. In other words, in (7) α_1 is set *a priori* equal to unity and ω_2 equal to zero.

Table 3

Estimation results[a] for $\ln M\,2/p = \alpha_0' + \frac{\alpha_1 \ln y}{(1-\omega_1 B)} + \frac{\alpha_3 \ln r}{(1-\omega_3 B)} + \frac{\alpha_4 \ln p'}{(1-\omega_4 B)} + \frac{\alpha_5 \ln c}{(1-\omega_5 B)}$ + seasonals + u.

		Real income (y)			Interest rate (r)			Inflation (p')			Cyclical indicator (c)[b]			
Country	Sample period	α_1	ω_1	Long-run elasticity	α_3	ω_3	Long-run elasticity	α_4	ω_4	Long-run elasticity	α_5	ω_5	Long-run elasticity	Box–Pierce χ^2_{12} test statistic[c]
Belgium	1961:IV–1976:IV	0.95 (16.84)	0.12 (2.52)	1.09	−0.14 (3.71)	0.55 (3.41)	−0.31	—	—	—	0.067$^+$ (2.07)	0.30$^+$ (1.01)	0.095$^+$	30.3
Denmark[d]	1971:I–1976:IV	0.76 (3.74)	0.52 (3.02)	1.58	−0.08 (1.42)	0.52 (3.02)	−0.16	−0.45 (1.94)	0.52 (3.02)	−0.94	0.014$^+$ (2.13)	0.52$^+$ (3.02)	0.028$^+$	15.0
France	1960:IV–1976:IV	1.61 (42.64)	—	1.61	−0.13 (3.13)	0.49 (3.83)	−0.26	−0.10[e] (0.58)	—	−0.10	−1.05 (9.26)	—	−1.05	102.6
Germany	1960:I–1976:IV	1.01 (13.29)	0.17 (2.47)	1.21	−0.12 (1.74)	0.38 (1.01)	−0.20	—	—	—	0.052$^+$ (4.70)	—	0.052$^+$	58.8
Ireland	1963:I–1973:IV	0.78 (6.99)	0.45 (5.42)	1.41	—	—	—	−1.37 (3.30)	—	−1.37	−0.33 (0.99)	—	−0.33	33.8
Italy	1962:II–1976:IV	1.68 (17.46)	0.06 (1.06)	1.78	−0.12 (3.32)	—	−0.12	—	—	—	−0.62 (2.76)	—	−0.62	102.1
Netherlands[d]	1960:I–1976:IV	0.25 (4.92)	0.79 (13.39)	1.19	−0.06 (2.19)	0.79 (13.39)	−0.30	−0.31 (3.18)	0.79 (13.39)	−1.49	−0.74 (2.97)	0.79 (13.39)	−3.61	13.2
United Kingdom	1964:IV–1976:IV	1.14 (5.92)	0.39 (3.81)	1.89	−0.18[e] (3.12)	—	−0.18	−0.45[e] (2.41)	—	−0.45	−0.08 (0.99)	—	−0.08	17.2

[a]The figures in parentheses are t-statistics.
[b]A + indicates that unemployment is used as a cyclical indicator.
[c]Corrected for downward bias.
[d]A Koyck-lag is used in the estimations.
[e]Lagged three quarters.

The estimation results for these real demand for money functions are presented in table 3. Again, the regressions comprise three seasonal dummies and a constant term, which are not shown in the table. The results with respect to switching are given in table 4.

Table 4[a]

Estimation results for the real demand for money functions with respect to the term structure.

Country	Short-term interest rate (r_s)	Dummy (dum r_s)
Germany	0.13 (6.87)	−0.23 (5.79)
Netherlands[b]	0.024 (3.39) [0.12]	−0.048 (3.25) [−0.23]
United Kingdom	0.14 (4.04)	−0.28 (4.42)

[a]The figures in parentheses are t-statistics.
[b]Long-run elasticities in brackets.

In the equation for *Belgium* inflation gets the wrong sign, while the speed of adjustment with respect to the unemployment rate increases drastically. The estimate of the *Danish* long-run income elasticity doubles when the price deflator is left out of the estimations. The unemployment rate as cyclical indicator now obtains the expected sign and differs significantly from zero. In the *German* equation too, the unemployment rate becomes highly significant. In the case of *Italy* inflation gets the wrong sign and the estimate of the interest rate elasticity is more than halved but remains significant. It must be noted that, of course, there is a substantial correlation between inflation and long-term interest rates. The *Dutch* demand for money function improves substantially by setting the price elasticity equal to unity. The coefficients of the rate of inflation and the cyclical indicator become significant even at the 1% level.[4] In the equation for the *United Kingdom* the measured long-run

[4]In accordance with (7) the equations are estimated either with a Koyck-lag (Denmark, The Netherlands) or with a different distributed lag for each explanatory variable (the other countries). By way of experiment for the Dutch real demand for money function estimates are also made with both a Koyck-lag, i.e., partial adjustment, and adaptive expectations for real income. The result for 1960:I–1976:IV is (t-values in parentheses; sre = short-run elasticity; lre = long-run elasticity):

Real income (y)				Interest rate (r)		Inflation (p')		Cyclical indicator (c_1)	
α_1	ω_1	sre	lre	sre	lre	sre	lre	sre	lre
0.23 (4.52)	0.19 (1.42)	0.28	1.35	−0.08 (2.45)	−0.38	−0.31 (3.21)	−1.49	−0.67 (2.59)	−3.24

Short-term interest rate (r_s)		Dummy (dum r_s)			Box–Pierce
sre	lre	sre	lre	Koyck-lag	χ^2_{12} test statistic
0.026 (3.54)	0.13	−0.055 (3.44)	−0.26	0.79 (13.33)	13.7

income elasticity decreased somewhat and the influence of inflation triples. In the case of *France* and *Ireland* there are no substantial differences between the estimation results of the nominal and the real demand for money function.

All estimates of the long-run elasticity of real income in table 3 are greater than unity. The lowest values are found in the Low Countries and Germany, and with respect to the high elasticities of France and Italy we recall the steadily growing liquidity ratio depicted in fig. 1. However, the high value of the income elasticity found for the United Kingdom is exceptional, the more so as the money stock grew proportionally less than income in this country. It is most probable that the United Kingdom's demand for money function lacks stability, especially in the seventies where there is an extraordinary sharp rise of the liquidity ratio in 1972–1974 and an equally sharp decline in 1974–1976 (see fig. 1).[5]

The high values of the Box–Pierce test statistic of the last columns of tables 1 and 3 indicate that, in most equations, the residuals differ significantly from white noise and need further investigation. We will do this for the real demand for money functions in the next section.

5. Further analysis of estimation results for the real demand for money functions

5.1. Analysis of the residuals

The question of whether the demand for money function is stable is of crucial importance in an empirical study, the more so as we conjecture that

This specification of the lag structure makes the measured long-run income elasticity increase from 1.19 to 1.35. We note that Fase and Kuné (1974), apart from partial adjustment, allowed for adaptive expectations with respect to both real income and the price deflator in their preferred specification of the nominal demand for money function.

[5]The lack of stability becomes apparent when we re-estimate the United Kingdom's real demand for money function for the 1964:IV–1978:IV period (t-values in parentheses; lre = long-run elasticity):

Real income (y)			Interest rate (r_{-3})	Inflation (p'_{-3})	Cyclical indicator (c_1)
α_1	ω_1	lre	α_3	α_4	α_5
0.88 (2.97)	0.13 (0.45)	1.02	−0.16 (2.42)	−0.22 (−0.96)	−0.05 (−0.41)

Short-term interest rate (r_s)	Dummy (dum r_s)	Box–Pierce $\bar{\chi}^2_{12}$ test-statistic
0.19 (5.16)	−0.31 (4.13)	53.2

By this extension of the sample period with two years the long-run income elasticity falls from 1.89 to 1.02 while the influence of inflation is no longer significant.

the economic turbulence of the last years may have affected the demand for money. Some indication of (in)stability can be gathered from comparison of the estimation results for the nominal and the real demand for money functions. In order to examine this matter further we show in table 5 the standard deviation of the residuals in the estimated equations for the real demand for money, considering the whole sample period and three subperiods of equal length.

Table 5

Standard deviation[a] of residuals.

Country	Sample period	Full sample period	First sub-period	Second sub-period	Third sub-period
Belgium	1961:IV–1976:IV	0.016	0.010	0.016	0.016
Denmark	1971:I–1976:IV	0.014	0.018	0.010	0.015
France	1960:IV–1976:IV	0.019	0.016	0.021	0.017
Germany	1960:I–1976:IV	0.026	0.023	0.026	0.026
Ireland	1963:I–1973:IV	0.042	0.043	0.031	0.046
Italy	1962:II–1976:IV	0.031	0.029	0.019	0.034
Netherlands	1960:I–1976:IV	0.014	0.015	0.012	0.015
United Kingdom	1964:IV–1976:IV	0.038	0.032	0.028	0.051

[a]The standard deviation is calculated without adjusting for the number of degrees of freedom used in the regression.

In this table three groups of countries can be distinguished. In the first, consisting of Belgium, France, Germany and The Netherlands the variation of the residuals is of about the same size in all three subperiods. In the second set including Denmark, Ireland and Italy, the standard deviations in the first and the last subperiod correspond to each other, but surprisingly, those of the second period obtain a much lower value. The standard deviation of the residuals in the United Kingdom which is in the third group, is much higher in the last subperiod than in the other two subperiods, again suggesting instability of this function in the seventies.

In order to trace what events could have had destabilising effect on the demand for money we present in table 6 the outliers of the residuals of our selected equations which have been dated to the purpose. With the exception of France, where we overestimate the money stock in all quarters of 1970, the number of outliers is surprisingly small considering the fact that for most countries we have about sixty residuals. The majority of the outliers relate to the seventies but from table 6 no single event clearly emerges as having caused a prominent and general shift in the demand for money in the EEC. Not even the oil-crisis may be mentioned in this respect as around that period an outlier only has been detected for France (1974:II).

Table 6

Outliers of the real demand for money functions.[a]

Belgium	Denmark	France	Germany	Ireland	Italy	Netherlands	United Kingdom
1967:I(−) 1968:I(−)	1971:IV(−)	1963:I(+) 1970:I/ 1970:IV(−) 1974:II(+) 1975:I(+)	1972:III(+)	1963:I(−) 1970:I(+)		1965:I(+)	1976:IV(−)

[a]Explanatory note: This table shows the observations where the residual of our demand for money function falls outside the two sigma range; + indicates a positive value of the residual and hence underestimation of the demand for money; − indicates a negative value of the residual and hence overestimation of the demand for money.

At the end of the previous section we concluded that the residuals for most countries differ significantly from white noise. This has led us to construct [according to the procedure described in Box and Jenkins (1970)] ARMA-models for the residuals. In other words we allow $\theta(B)$ in specification (3) to be determined by the data without imposing *a priori* restrictions on it. These ARMA-models are not only useful in view of this analysis of the residuals, but are also applied when predicting the money stock.

Table 7 shows the ARMA-models transforming the residuals to white noise. In the case of Denmark and The Netherlands we have not estimated an ARMA-model as the residuals of these demand for money functions with a Koyck-lag are already white noise. Seasonal moving average parameters appear in the models for Belgium, Ireland and Italy. It means that in the demand for money functions of these countries the seasonal dummies are too rigid to capture seasonality completely.

According to widely accepted economic theory the demand for money balances should be formulated in stocks. Yet, a number of empirical studies on the demand for money estimates the demand function in first differences instead of levels. Stationarity of the disturbances, which is, as known, a necessary condition for statistical inference in regression analysis, is often alleged as a rationale for it. However, the ARMA-models of table 7 show that in our demand for money functions the residuals are stationary series. Hence, estimating in levels is in our case also statistically justified. Here, differencing may lead to misspecification as argued by Hendry and Mizon (1978).[6]

[6]For those functions where the residuals are no white noise, the t-values of the parameter estimates in tables 1 and 3 may be biased [e.g., see Kiviet (1980)]. We have tried to estimate the parameters of the demand for money functions and the ARMA-models jointly, but unfortunately the iteration algorithm either did not converge or converged to implausible parameter values (including values outside the admissible regions for the ARMA-parameters).

Table 7

ARMA-models for the residuals of the real demand for money functions.[a]

Country	Sample period	Auto-regressive parameters ϕ_1	Moving average parameters θ_1	θ_2	θ_4	θ_8	$\bar{\chi}^2_{12}/\sigma_a$
Belgium	1961:IV–1976:IV	0.32 (2.49)	—	—	−0.31 (2.27)	—	7.2 0.015
Denmark	1971:I–1976:IV	—	—	—	—	—	15.0 0.014
France	1960:IV–1976:IV	0.74 (8.37)	—	—	—	—	8.2 0.013
Germany	1960:I–1976:IV	0.66 (7.14)	—	—	—	—	12.7 0.020
Ireland	1963:I–1973:IV	0.57 (4.99)	—	—	−0.32 (1.83)	—	10.9 0.030
Italy	1962:II–1976:IV	0.69 (6.10)	—	−0.24 (1.89)	0.34 (2.33)	0.40 (2.93)	14.0 0.018
Netherlands	1960:I–1976:IV	—	—	—	—	—	13.2 0.014
United Kingdom	1964:IV–1976:IV	—	−0.36 (2.37)	−0.43 (2.79)	—	—	9.1 0.033

[a]Explanatory note: ARMA-models of the following general form are estimated: $(1-\sum \phi_i B^i)u_t = (1-\sum \theta_i B^i)a_t$ where u_t is the residual and a_t the noise of the ARMA-model; t-values are in parentheses under the coefficients; $\bar{\chi}^2_{12}$ is the Box–Pierce test-statistic with 12 degrees of freedom (adjusted for downward bias); σ_a is the standard deviation of the noise (adjusted for degrees of freedom).

The stability of a regression equation is commonly assessed by re-estimating that equation for two (or more) subperiods and applying a Chow-test. Because of non-linearities and the length of the sample period we were unable to follow this procedure, but re-estimated the ARMA-models of the residuals for two equal subperiods. The results suggest stability in the case of France, Germany and Italy, and instability in the case of Belgium, Ireland and the United Kingdom.

5.2. Forecasting the money stock

One of the main objectives of this study is to come to a uniform forecasting device for the broadly defined money stock in the EEC countries. In order to assess the predictive power of our equations we present in table 8 the root mean square error of the *ex ante* forecasts for 1977 and 1978. In these forecasts we used the realised values of the explanatory variables.

Forecasts of the residuals are obtained from the ARMA-models from 1976:IV onwards. Of course the figures of table 8 give but a very limited indication of the predictive power as they cover two years only.

From table 8 we see that in general our equations yield poor predictions for 1977 and 1978. In The Netherlands and the United Kingdom we overestimated the money stock, while *M 2* grew faster than predicted in Belgium and Italy. The bad performance of the equation for The Netherlands in 1978 is partly due to the fact, that in this equation the predicted values of the lagged dependent variable are used and therefore the prediction errors cumulate.

Table 8

Root mean square error of *ex ante* forecasts of the money stock in 1977:I–1978:IV.[a]

Period	Belgium (in billions of BFr)	France (in billions of FFR)	Germany (in billions of DM)
1977:I–1977:IV	32.6 (1.6)	14.8 (1.6)	16.8 (5.6)
1978:I–1978:IV	86.2 (3.7)	35.6 (3.4)	13.8 (4.1)
1977:I–1978:IV	65.2 (2.9)	27.3 (2.8)	15.4 (4.9)
	Italy (in 1.000 billions of Lire)	**Netherlands (in billions of Fl)**	**United Kingdom (in billions of £)**
1977:I–1977:IV	11.3 (6.4)	5.3 (5.7)	5.0 (10.6)
1978:I–1978:IV	18.9 (8.6)	12.1 (12.5)	3.5 (6.5)
1977:I–1978:IV	15.6 (7.9)	9.3 (9.8)	4.3 (8.5)

[a]In parentheses as a percentage of the average money stock in the relevant year(s).

The stability of the demand for money function, which is a necessary condition for predictive power, has extensively been explored by, e.g., Goldfeld (1976) and Laidler (1980). The present analysis is along similar lines as Goldfeld's paper in that it focusses on *M 2* rather than *M 1* as is common in many US money demand studies. As Goldfeld's this study attributes considerable importance to modelling the adjustment lags, without ending up with stable demand functions for all countries considered. However, most EEC countries are small fixed exchanged rate open economies in which the money supply is endogeneous. This issue and its implications for the appropriate estimation of the demand for money has recently been explored by Laidler (1980). In this respect our results seem to indicate that the underlying long-run elasticities of the demand for money functions are more stable than the short-run elasticities and the parameters of the dynamic processes.

6. Summary and conclusions

This paper has attempted to estimate both nominal and real demand for money equations for the EEC countries (except Luxembourg), using a common econometric framework and a uniform data file which is constructed with data supplied to us by the various central banks. This framework allows us to use the same but very general dynamic structure for all countries.

Our empirical estimates show that in the nominal demand for money functions the long-run income elasticities range from 0.77 (Denmark) to 2.13 (United Kingdom). Although we measure a price elasticity significantly greater than unity for Belgium, Germany and Italy in these functions, we prefer for empirical reasons the results on the real demand for money. Here all estimates of the income elasticity are above unity with the lowest value in Belgium (1.09) and the highest in the United Kingdom (1.89). Confining ourselves to these real demand for money functions, only in the case of Ireland no (negative) influence of the long-term interest rate on the demand for money could be traced. In the other countries long-run interest rate elasticities cluster around -0.20 with the highest value in Belgium (-0.31) and the lowest in Italy (-0.12). The range of the estimated elasticities of inflation is much greater. We found no influence in Belgium, Germany and Italy and very little in France, while the elasticity is greater than unity in Ireland and The Netherlands. The inclusion of a cyclical indicator as an explanatory variable is a novelty of this study. We could assess the cyclical influence on the demand for *M.2* for all countries, although the estimations for Ireland and the United Kingdom do not differ significantly from zero. As the way of measurement of the cycle varies from country to country, the size of the elasticities cannot be compared amongst the countries.

We believe that the inclusion of a cyclical indicator may lead to more stable demand functions. To that end we have also accounted for interest rate induced switching in Germany, The Netherlands and the United Kingdom. In order to examine the question of stability we have analyzed both the residuals and the predictive power of our equations. According to different criteria our analysis of the residuals suggests stability of the demand for money functions in the majority of the countries. However, the United Kingdom's demand for money function is, in our specification, obviously unstable in the seventies. The predictive performance of the equations for 1977 and 1978 turned out to be poor in comparison with the residual standard errors in the sample period. This may be just bad luck, but it may also indicate that our demand for money functions are not so stable outside the sample period.

An important property of our equations concerns its lag structure, notably in view of the speed of adjustment of actual to desired money balances, and of expected to actual values of the explanatory variables. A specification with partial adjustment appeared to be necessary in order to obtain economically plausible outcomes for Denmark and The Netherlands. For all other countries, however, partial adjustment did not lead to useful results. Therefore we have estimated our equations with either partial adjustment or adaptive expectations, noting that adaptive expectations is identical to partial adjustment when the expectations of the explanatory variables adjust to the actual values with the same speed of adjustment for each variable. Our estimates show a great variety of speeds of adjustment in the case of adaptive expectations, while in the case of partial adjustment the average speed is low in The Netherlands and somewhat higher in Denmark. We noticed that the specification of the lag structure has a considerable impact on the numerical values of the estimated elasticities in the demand for money functions.

As a final comment we mention that in addition to the reported results we have tested two alternative specifications. First we included the rate of interest linearly rather than logarithmic-linearly. Thus we allow the interest rate elasticity of the demand for money to increase with the level of interest. Second, we extended our original specification by adding the (expected) rate of appreciation of the home currency as an explanatory variable, as an expected appreciation may encourage foreigners to hold cash balances of the strong currency country (and *vice versa*). However these modifications did not improve our results. This is especially surprising in the case of the appreciation variable, as one expects the recent commotions in the foreign exchange markets to be partly responsible for the instability of the demand for money in the seventies. Some of these effects may have been captured by the short-term interest rate variable, which is introduced in our equations for Germany, The Netherlands and the United Kingdom to take account of interest rate induced switching.

Appendix: The data

Table A.1 lists the basic data used in this study. A blank means not available in our data base. It must be noted that some of the data in the table do not stem from public sources but are provided to us only for the purpose of this demand for money study.

In some cases our data are not completely in conformity with the general characteristics set out in section 3.1, while in other cases we did not use the data of the central banks. This leads us to make the following remarks for the individual countries. In addition we indicate what measure is used for the first cyclical indicator (*c 1*).

Belgium	—Up to 1969:III data on $M\,2$ are collected from 'Main Economic Indicators'; from 1969:IV we use the new series on $M2$ provided to us by the National Bank of Belgium; both series are end of quarter figures; $c\,1$ is the so-called 'synthetic curve' of the National Bank.
Denmark	—$c\,1$ is constructed by means of the volume of retail sales; data on $c\,2$ are collected from 'Main Economic Indicators'.
France	—$c\,1$ is constructed by means of the volume of the gross industrial production.
Germany	—r_s is the interest rate on three month interbank deposits; $c\,1$ is the index of output in the producing sector, excluding construction and energy industry, with its trend removed.
Ireland	—Yearly figures for p are derived from tables A.3 and A.4 of 'National Income and Expenditure'. From these we constructed quarterly figures by means of the so-called Lisman-method [see Boot, Feibes and Lisman (1967)]; $c\,1$ is the index of capacity utilisation.
Italy	—The data on $M\,2$ and r are end of quarter figures; $c\,1$ is the index for the assessment of total order books of industrial firms.
Netherlands	—r_s is the interest rate on three month loans to local authorities; $c\,1$ is the utilisation rate of labour.
United Kingdom	—For the money stock end of quarter figures of $M\,3$ are used; the data on r are also end of quarter figures; r_s is the interest rate on three month interbank sterling deposits; $c\,1$ is the C.S.O. measure of the deviations from trend of the percentage of firms reporting below-capacity working to the Confederation of British Industries.

Table A.1

Basic data.

		Belgium (billions of Bfr)					Denmark (billions of DKr)				
		$M2$	Y	p 1970=100	$c2$ %	r %	$M2$	Y	p 1970=100	$c2$ %	r %
1960	I		570.5	72.1	3.3	6.08					
	II		569.1	71.8	3.2	6.07					
	III		564.7	71.6	3.0	6.61					
	IV		581.6	72.0	2.9	6.76					
1961	I	268.0	591.1	72.7	2.8	6.87					
	II	272.6	604.3	72.6	2.5	6.81					
	III	278.0	613.9	72.6	2.2	6.73					
	IV	289.0	615.7	72.8	2.1	6.61					
1962	I	292.1	633.5	73.1	2.0	6.29					
	II	300.8	638.0	73.2	2.0	6.01					
	III	305.0	656.0	73.7	1.9	5.74					
	IV	310.4	664.1	74.0	1.8	5.77					
1963	I	320.8	657.4	75.2	1.7	5.46					
	II	330.5	692.8	75.3	1.6	5.70					
	III	328.2	708.7	75.8	1.6	5.82					
	IV	341.9	723.7	76.6	1.5	5.95					
1964	I	341.7	748.0	77.1	1.3	6.42					
	II	352.0	770.4	79.0	1.3	6.44					
	III	353.0	783.8	79.8	1.3	6.48					
	IV	367.6	810.3	81.0	1.4	6.47					
1965	I	368.0	818.9	81.6	1.4	6.42					
	II	385.8	838.4	82.4	1.5	6.46					
	III	385.1	857.7	83.9	1.4	6.39					
	IV	400.4	880.4	85.0	1.5	6.48					
1966	I	401.1	887.1	85.6	1.6	6.52					
	II	415.4	900.4	86.3	1.6	6.64					
	III	414.0	927.1	87.2	1.7	6.73					
	IV	434.3	933.2	88.0	1.7	6.72					
1967	I	430.0	976.3	89.0	2.0	6.76					
	II	453.9	967.9	89.3	2.2	6.77					
	III	455.8	974.0	89.4	2.3	6.65					
	IV	466.7	991.6	90.1	2.5	6.56					
1968	I	473.4	1,034.6	92.0	2.6	6.54					
	II	498.8	1,029.5	91.3	2.7	6.48					
	III	494.2	1,045.6	91.5	2.7	6.54					
	IV	511.1	1,073.6	92.4	2.7	6.62					
1969	I	516.9	1,105.7	93.7	2.5	6.77					
	II	541.9	1,134.8	94.3	2.3	7.14					
	III	531.4	1,181.2	96.3	2.2	7.48					
	IV	789.4[a]	1,215.3	97.8	2.0	7.78					
1970	I	801.3	1,251.9	99.1	1.8	7.70	54.3	116.0	97.0	1.7	10.50
	II	826.9	1,281.4	100.0	1.9	7.78	56.0	122.0	98.6	1.0	10.89
	III	838.6	1,319.2	100.6	1.8	7.94	55.7	127.0	101.5	0.8	12.76
	IV	868.0	1,313.8	100.2	1.8	7.78	56.2	128.7	102.9	1.3	11.68

[a]Break in series.

Table A.1 (*continued*)

1971	I	881.9	1,342.0	102.0	1.7	7.50	56.2	131.3	102.7	1.5	10.65
	II	925.7	1,399.3	104.1	1.8	7.35	58.2	135.9	106.3	1.6	10.53
	III	939.2	1,430.4	106.2	1.8	7.25	60.4	143.9	109.1	1.7	10.53
	IV	979.2	1,490.2	108.3	1.9	7.18	60.6	146.3	110.9	1.9	10.55
1972	I	1,003.1	1,495.1	108.1	2.1	7.01	60.7	147.7	113.1	2.0	10.61
	II	1,069.2	1,563.4	110.0	2.2	7.07	64.4	155.6	115.5	1.7	10.42
	III	1,083.7	1,573.9	111.0	2.3	6.95	65.6	159.1	118.1	1.4	10.42
	IV	1,145.4	1,704.7	114.8	2.3	7.15	68.9	161.9	119.0	1.2	10.32
1973	I	1,139.[illegible]	1,724.8	115.4	2.3	7.31	69.4	168.8	122.8	1.1	11.33
	II	1,248.8	1,761.1	117.2	2.3	7.28	73.3	170.0	126.1	1.1	11.58
	III	1,257.6	1,813.9	118.7	2.4	7.59	75.1	180.5	131.3	0.9	12.15
	IV	1,321.7	1,898.4	122.6	2.4	7.79	78.5	188.7	134.6	1.0	12.67
1974	I	1,380.1	2,016.4	126.2	2.3	8.24	77.1	189.8	136.7	1.[illegible]	12.97
	II	1,436.4	2,053.1	128.7	2.4	8.78	79.8	195.5	140.8	1.8	14.87
	III	1,446.6	2,190.5	137.4	2.7	9.07	80.2	198.9	146.2	2.9	14.55
	IV	1,510.8	2,210.0	139.7	3.1	8.98	85.1	207.0	153.6	4.2	14.34
1975	I	1,558.8	2,310.3	146.2	3.6	8.91	85.0	221.3	159.4	5.1	12.77
	II	1,622.1	2,317.8	150.3	4.2	8.19	91.5	220.2	161.8	6.6	12.30
	III	1,651.2	2,341.0	150.3	4.7	8.37	96.0	230.6	167.7	6.6	12.13
	IV	1,736.2	2,378.1	152.2	5.3	8.58	105.8	244.6	167.9	6.1	12.37
1976	I	1,793.4	2,472.9	155.6	5.3	8.92	108.4	252.1	173.0	5.7	13.27
	II	1,868.7	2,636.8	158.5	5.6	9.16	114.1	256.5	177.7	6.1	14.05
	III	1,897.9	2,708.8	162.7	5.8	9.04	114.2	260.9	179.0	6.5	14.47
	IV	1,983.9	2,824.0	167.3	5.9	9.23	118.2	265.9	184.3	6.4	14.95
1977	I	2,033.9	2,802.8	168.8	6.1	9.13	119.4	275.3		6.6	15.03
	II	2,081.9	2,858.2	170.4	6.4	8.83	126.8	281.8		7.8	15.37
	III	2,094.1	2,903.1	174.4	6.7	8.57	126.2	291.9		8.5	16.04
	IV	2,789.2	2,943.0	175.1	6.8	8.52	132.7	301.5		7.9	16.04
1978	I	2,247.7	3,015.[illegible]	176.4	6.9	8.52				8.6	
	II	2,352.7	3,009.5	177.9	7.1	8.23				9.1	
	III	2,341.6	3,[illegible]01.7	176.9	7.0	8.37				9.3	
	IV	2,411.6	3,169.6	185.2	7.0	8.70				8.7	

		France (billions of Ffr)					Germany (billions of DM)					
		$M2$	Y	p 1970=100	$c1$	r %	$M2$	Y	p 1970=100	$c2$ %	r %	r_s %
1960	I	90.3	259.6	68.3	98.3	5,79	67.0	290.6	69.8	1.2	6.4	
	II	93.9	266.8	69.0	98.4	5.76	68.5	294.7	69.9	1.0	6.5	
	III	99.1	274.2	69.1	99.3	5.58	69.6	307.7	70.7	0.7	6.6	
	IV	103.3	279.0	69.2	99.4	5.52	71.4	318.5	71.6	0.9	6.2	
1961	I	108.1	285.7	70.0	99.1	5.59	71.5	324.8	72.3	0.7	6.0	
	II	112.4	287.7	70.2	99.0	5.49	74.6	326.2	73.0	0.8	5.6	
	III	117.4	297.2	71.0	99.5	5.44	76.9	332.9	74.3	0.7	5.9	
	IV	121.6	304.0	72.0	98.7	5.55	79.6	341.4	74.6	0.7	6.0	
1962	I	126.1	316.1	72.7	99.3	5.59	79.8	349.6	75.4	0.7	5.7	
	II	131.4	325.5	73.6	99.1	5.47	82.6	358.3	76.5	0.7	5.8	
	III	139.0	330.7	73.3	99.7	5.34	83.8	363.3	77.3	0.7	6.0	
	IV	144.2	338.2	74.3	99.3	5.34	86.6	370.9	77.4	0.7	6.2	

Table A.1 (*continued*)

	France (billions of Ffr)					Germany (billions of DM)					
	$M2$	Y	p 1970=100	$c1$	r %	$M2$	Y	p 1970=100	$c2$ %	r %	r_s %
1963 I	149.9	339.6	75.7	97.8	5.35	85.0	355.4	78.5	0.9	6.0	
II	154.4	361.5	76.7	100.0	5.31	87.1	384.1	78.7	0.8	6.1	
III	161.1	373.9	77.8	101.2	5.30	89.2	390.0	78.5	0.8	6.1	
IV	165.1	386.4	78.4	101.0	5.39	92.1	399.2	79.9	0.8	6.0	
1964 I	168.5	397.7	78.9	101.9	5.44	91.4	405.8	80.2	0.9	5.9	
II	171.7	406.4	79.6	101.8	5.47	93.9	415.3	80.8	0.7	6.3	
III	178.3	407.8	79.6	100.8	5.42	95.5	422.4	81.6	0.7	6.3	
IV	181.2	414.8	80.3	100.2	5.47	98.4	434.5	82.3	0.7	6.4	
1965 I	184.4	422.1	81.1	99.7	6.02	98.4	445.3	82.9	0.7	6.5	
II	189.9	432.1	81.4	100.2	6.29	100.8	454.7	83.7	0.6	6.9	
III	197.7	444.0	82.1	100.1	6.18	101.4	461.7	84.5	0.6	7.3	
IV	201.6	453.0	82.3	100.7	6.32	104.7	470.8	85.1	0.6	7.6	
1966 I	205.8	462.0	82.9	101.0	6.37	103.7	483.9	86.1	0.6	7.6	
II	211.8	472.5	83.5	101.2	6.53	106.8	488.2	86.8	0.6	8.2	
III	219.8	478.2	84.1	101.1	6.66	108.6	492.5	87.5	0.8	8.6	
IV	222.7	489.2	85.0	100.6	6.76	111.4	485.0	88.5	1.2	8.1	
1967 I	226.7	500.9	85.3	100.7	6.72	110.8	488.1	88.3	1.8	7.4	
II	233.8	507.7	85.7	99.9	6.70	113.6	489.9	88.5	2.5	6.9	
III	244.2	520.1	86.5	100.3	6.67	115.8	492.0	88.1	2.6	6.8	
IV	251.0	529.6	87.0	100.2	6.74	122.5	505.2	89.0	2.2	6.8	
1968 I	254.2	545.3	87.1	102.1	6.77	123.3	513.7	89.3	1.7	6.7	
II	265.3	506.9	88.3	94.0	6.91	127.9	523.9	89.4	1.6	6.5	
III	277.2	584.4	90.3	103.1	6.92	131.2	539.9	90.1	1.3	6.3	
IV	282.9	605.0	91.9	103.5	7.20	139.7	563.5	91.3	1.1	6.3	
1969 I	285.7	619.5	93.8	102.9	7.63	137.4	563.7	91.1	1.0	6.3	
II	293.2	640.5	94.4	104.1	7.71	143.9	584.4	92.0	0.8	6.6	
III	301.2	653.1	95.8	103.2	7.91	147.8	612.1	93.6	0.7	7.0	
IV	301.7	661.0	96.7	102.5	8.22	154.1	630.3	95.9	0.7	7.5	
1970 I	302.9	685.7	98.3	102.8	8.78	149.8	641.7	97.7	0.7	7.8	9.48
II	312.4	712.1	99.3	104.4	8.60	155.8	674.5	98.9	0.6	8.4	9.80
III	323.9	721.5	100.4	103.6	8.44	162.2	689.4	101.2	0.7	8.5	9.35
IV	340.7	748.1	101.9	103.8	8.38	167.6	710.2	102.1	0.7	8.5	8.85
1971 I	353.0	759.8	103.2	103.8	8.38	168.8	732.2	105.1	0.8	7.8	7.49
II	369.2	784.4	105.2	103.4	8.45	179.0	748.8	107.1	0.8	8.0	7.41
III	387.1	808.3	106.2	104.2	8.46	181.8	765.8	108.6	0.9	8.2	7.60
IV	403.6	835.7	107.5	104.9	8.40	191.9	777.6	110.2	1.0	7.9	7.06
1972 I	414.7	862.5	109.5	105.5	8.27	192.3	807.7	112.3	1.0	7.4	4.96
II	437.2	876.3	110.7	104.5	7.88	199.8	811.6	112.6	1.2	7.8	4.71
III	463.4	904.3	112.7	104.3	7.83	210.4	832.0	114.6	1.2	7.9	4.92
IV	481.2	936.1	114.6	105.3	8.07	222.5	857.7	115.4	1.1	8.3	7.85
1973 I	480.7	964.7	115.5	106.3	8.41	227.9	896.8	118.0	1.1	8.5	8.21
II	505.9	992.2	118.0	105.7	8.73	239.5	911.2	119.9	1.1	9.3	12.22
III	525.5	1,025.1	120.7	105.2	9.30	246.2	927.7	121.3	1.2	9.8	14.37
IV	545.8	1,075.9	124.2	105.5	9.55	258.5	944.7	123.2	1.6	9.6	13.77

Table A.1 (*continued*)

1974	I	560.8	1,122.1	127.3	106.4	10.46	256.9	963.2	124.9	2.0	10.0	11.32
	II	587.2	1,162.6	130.3	107.0	11.00	263.1	977.1	127.1	2.4	10.6	9.54
	III	605.8	1,217.6	135.6	106.6	11.39	260.4	999.4	130.0	2.8	10.7	9.61
	IV	634.4	1,206.2	140.7	99.4	11.17	269.4	1,008.1	133.7	3.5	10.6	9.14
1975	I	651.2	1,226.5	146.2	99.4	10.64	263.4	1,008.7	135.5	4.0	8.9	6.69
	II	671.4	1,267.7	149.3	94.0	10.29	255.9	1,020.8	137.2	5.0	8.4	4.92
	III	706.1	1,288.8	152.3	92.9	10.14	255.0	1,041.9	138.7	5.2	8.3	4.16
	IV	749.7	1,355.8	155.0	94.7	10.17	269.9	1,064.5	138.9	5.0	8.4	4.13
1976	I	771.4	1,419.9	158.3	97.1	10.17	261.7	1,091.2	139.9	4.7	8.1	3.80
	II	804.5	1,483.6	163.2	96.2	10.25	270.3	1,116.9	141.6	4.6	8.0	3.84
	III	828.2	1,531.6	167.3	96.4	10.61	275.8	1,127.4	142.2	4.6	8.3	4.53
	IV	854.7	1,562.4	170.8	94.6	10.95	292.7	1,150.9	144.3	4.4	7.7	4.82
1977	I	871.0	1,613.8	172.6	95.0	10.81	283.9	1,163.6	144.8	4.4	6.9	4.74
	II	893.7	1,629.3	177.3	91.6	11.06	291.4	1,181.4	146.5	4.6	6.2	4.45
	III	927.7	1,665.8	181.3	90.1	11.06	298.2	1,199.6	148.1	4.6	5.8	4.19
	IV	965.2	1,713.8	184.9	88.6	11.06	320.8	1,230.8	150.1	4.6	5.7	4.09
1978	I	985.4	1,746.4	185.7	87.7	11.22	314.1	1,236.0	150.8	4.5	5.4	3.52
	II	1,015.5	1,834.0	191.7	87.3	10.70	321.5	1,271.1	151.9	4.4	5.4	3.61
	III	1,051.9	1,896.0	197.6	85.9	10.42	334.0	1,303.0	154.6	4.3	6.0	3.72
	IV	1,090.0	1,956.8	201.5	85.7	10.10	364.7	1,320.9	155.4	4.2	6.2	3.95

		Ireland (billions of Irish £)					Italy (1,000 billions of Lires)				
		$M2$	Y	p 1970=100	cl	r %	$M2$	Y	p 1970=100	cl	r %
1960	I	394.4	763.7	59.8		5.14	13.3	21.1	63.6		5.56
	II	399.6	743.7	60.1		5.19	13.6	21.4	63.5		5.50
	III	400.7	770.7	60.3		5.64	14.2	21.9	64.3		5.50
	IV	415.3	813.0	60.5		5.85	15.1	22.1	64.6		5.69
1961	I	412.5	697.7	60.8		5.95	15.2	23.1	65.3		5.42
	II	421.6	734.4	61.3		5.86	15.6	23.8	65.8		5.49
	III	426.4	709.4	62.0		6.12	16.2	24.4	66.0		5.58
	IV	446.8	749.9	62.8		6.21	17.5	25.1	66.6		5.63
1962	I	445.8	766.1	63.7		6.42	17.7	26.0	67.9		5.70
	II	451.3	780.3	64.5		6.17	18.2	26.8	69.4	100.9	5.86
	III	459.3	775.4	65.2		6.09	18.9	27.4	70.4	100.6	6.02
	IV	480.4	796.8	65.6	100.0	5.56	20.5	28.3	71.6	100.5	6.09
1963	I	476.4	811.7	66.0	96.8	5.59	20.7	29.3	73.9	100.3	6.00
	II	483.5	818.8	66.7	96.2	5.53	21.2	30.6	75.2	100.2	6.11
	III	493.7	853.4	67.6	98.8	5.47	21.8	31.5	76.0	99.8	6.24
	IV	503.7	856.6	68.8	100.5	5.34	23.1	32.8	77.9	99.6	6.50
1964	I	513.1	907.0	70.3	100.4	5.64	22.7	33.6	79.1	97.6	6.87
	II	517.2	955.0	71.7	101.5	5.72	22.9	33.7	80.1	95.4	7.54
	III	530.8	932.6	72.9	100.6	6.20	23.3	34.0	81.1	94.8	7.41
	IV	550.7	959.8	73.9	100.1	6.15	25.1	34.4	82.5	94.5	7.20
1965	I	544.9	981.4	74.8	101.1	6.02	25.1	35.5	83.7	94.4	6.98
	II	552.6	1,003.1	75.5	100.5	6.09	25.8	36.1	83.7	95.6	6.91
	III	562.1	1,023.6	76.2	99.8	6.37	26.7	36.8	84.4	96.5	6.87
	IV	575.3	1,040.8	76.9	100.0	6.50	29.0	37.7	84.9	97.1	6.69

Table A.1 (*continued*)

	Ireland (billions of Irish £)					Italy (1,000 billions of Lires)				
	$M2$	Y	p 1970=100	cl	r %	$M2$	Y	p 1970=100	cl	r %
1966 I	577.7	1,069.2	77.6	97.3	6.58	29.0	38.3	85.5	98.5	6.52
II	621.5	1,073.5	78.3	91.9	6.80	29.8	39.0	85.8	99.4	6.54
III	643.1	1,107.1	79.0	97.7	7.06	30.7	40.2	86.3	99.7	6.55
IV	677.3	1,113.4	79.6	95.0	7.41	33.0	40.6	86.8	99.8	6.57
1967 I	674.5	1,124.9	80.3	96.7	7.19	33.0	42.0	87.9	99.7	6.57
II	690.5	1,142.2	80.9	95.8	6.90	33.8	43.2	88.7	99.1	6.66
III	724.1	1,195.5	81.6	93.7	6.87	34.7	43.9	88.8	98.9	6.70
IV	749.1	1,196.9	82.3	93.2	7.00	37.4	44.9	88.9	98.5	6.72
1968 I	767.1	1,248.0	83.2	95.6	7.19	37.0	45.3	89.5	98.6	6.75
II	788.7	1,328.0	84.3	97.2	7.18	38.0	46.4	89.8	98.8	6.79
III	836.7	1,352.7	85.7	97.5	7.46	39.0	47.5	90.0	99.4	6.80
IV	867.4	1,377.0	87.3	96.7	7.59	41.7	48.7	90.3	100.5	6.78
1969 I	887.3	1,368.5	89.1	91.9	8.00	41.7	50.0	91.4	101.1	6.70
II	898.9	1,487.8	91.0	100.0	8.65	42.5	51.6	92.7	102.2	6.77
III	925.4	1,539.7	92.9	97.8	9.23	43.5	52.9	94.9	102.3	7.09
IV	960.9	1,620.0	94.8	96.6	9.49	46.4	52.3	95.8	100.9	7.66
1970 I	1,007.4	1,480.0	96.7	95.4	9.48	46.5	56.4	97.9	100.9	8.15
II	1,041.4	1,642.9	98.8	95.4	9.41	47.6	57.3	99.4	99.6	9.13
III	1,062.9	1,716.2	101.1	100.0	9.67	48.4	58.2	100.4	98.5	9.72
IV	1,102.9	1,810.2	103.5	97.5	9.66	52.8	59.8	102.3	97.3	9.19
1971 I	1,143.4	1,820.1	106.0	95.5	10.19	52.3	61.5	105.0	96.7	8.28
II	1,183.9	1,799.6	108.6	95.2	9.91	54.5	62.4	107.0	95.8	8.25
III	1,200.3	1,895.0	111.1	94.5	9.49	56.5	63.0	107.3	95.5	8.24
IV	1,244.8	2,000.3	113.9	93.9	9.23	61.8	65.3	109.3	96.9	7.92
1972 I	1,255.3	2,154.2	117.2	92.0	8.55	62.2	66.9	111.4	96.5	7.67
II	1,283.3	2,216.5	121.4	92.6	9.48	64.6	67.5	112.2	97.0	7.24
III	1,345.7	2,293.0	126.6	93.0	10.18	66.6	68.7	114.4	97.9	7.28
IV	1,397.9	2,448.0	132.5	95.2	10.32	73.0	73.2	117.2	99.7	7.40
1973 I	1,473.1	3,022.5	138.3	98.5	10.32	73.7	75.2	121.6	99.4	7.40
II	1,529.2	2,641.4	142.8	98.2	10.97	77.9	80.5	125.1	101.0	7.46
III	1,622.1	2,756.8	145.7	97.5	11.95	80.8	85.2	129.1	101.7	7.40
IV	1,744.6	2,781.4	147.1	94.9	13.13	90.0	89.1	132.2	102.0	7.65
1974 I	1,807.8		148.2	100.0	14.54	91.1	94.3	138.1	101.0	7.78
II	1,866.3		150.7	96.1	15.27	94.6	100.0	145.5	99.3	9.81
III	1,945.6		155.5	93.4	15.89	95.7	104.6	154.5	97.2	11.08
IV	2,061.1		163.0	89.4	18.23	103.9	108.0	163.7	94.4	12.68
1975 I	2,141.9		173.0	86.2	15.48	106.2	111.3	170.1	93.3	11.16
II	2,197.3		184.5	83.3	15.33	110.6	112.8	173.9	93.1	11.25
III	2,316.1		196.6	82.0	14.49	116.2	115.1	178.1	93.4	11.29
IV	2,497.0		209.0	83.8	16.44	128.3	121.1	182.5	94.6	11.37
1976 I						133.2	130.7	192.4	96.8	11.87
II						137.2	140.5	204.1	97.7	13.50
III						142.2	146.5	212.4	98.2	13.65
IV						157.9	157.7	223.5	97.8	14.53

Table A.1 (*continued*)

1977 I	164.0	168.7	235.0	96.6	14.65
II	170.7	169.7	242.6	95.7	14.76
III	176.4	173.9	249.8	95.3	14.60
IV	195.8	179.6	258.3	94.9	14.21
1978 I	202.7	189.0	266.5	95.4	13.66
II	210.3	196.4	276.9	96.2	13.40
III	218.5	203.8	285.4	97.1	13.10
IV	246.3	219.2	295.8	98.6	13.18

	The Netherlands (billions of Fl.)						United Kingdom (billions of £)					
	$M2$	Y	p 1970=100	$c\,l$	r %	r_s %	$M3$	Y	p 1970=100	$c\,l$	r %	r_s %
1960 I	15.7	40.9	60.2	99.1	4.56					115.2		
II	16.0	41.9	59.8	99.3	4.51					116.8		
III	15.4	42.4	61.0	99.5	4.40					116.6		
IV	16.2	43.8	60.7	99.6	4.35					115.5		
1961 I	16.5	44.9	62.2	99.7	4.30					113.6		
II	16.8	44.6	62.1	99.8	4.09					110.6		
III	17.0	44.6	62.0	99.9	4.17					105.8		
IV	16.6	45.1	61.7	99.9	4.16					100.0		
1962 I	16.9	46.7	63.6	99.9	4.08					94.0		
II	17.3	47.3	64.3	99.9	4.32					89.5		
III	17.9	48.9	63.8	99.9	4.30					86.1		
IV	17.7	48.8	65.[illegible]	99.9	4.24					84.3		
1963 I	18.2	48.6	68.9	99.9	4.22		10.7	25.6	74.9	84.7	5.69	
II	18.8	51.4	66.3	99.9	4.20		11.1	26.9	75.7	85.8	5.28	
III	19.4	53.3	66.5	100.0	4.24		11.3	27.0	75.8	91.3	5.21	
IV	19.4	55.4	68.0	100.0	4.57		11.8	28.0	76.9	97.8	5.63	
1964 I	20.0	58.5	71.0	100.1	4.84		11.6	28.1	76.2	103.0	5.76	
II	20.3	60.3	72.6	100.1	4.95		11.8	29.1	77.5	108.2	5.97	
III	21.0	62.2	73.5	100.1	5.28		12.1	29.7	79.7	111.3	6.00	
IV	21.1	64.6	74.8	100.0	5.29		12.5	29.9	79.3	113.3	6.41	
1965 I	22.2	66.3	75.6	99.9	5.12		12.2	30.5	80.2	114.7	6.53	
II	22.9	67.3	77.2	99.9	5.36		12.7	30.8	80.4	111.0	6.78	
III	23.6	69.2	78.3	99.9	5.58		12.8	31.6	81.7	107.8	6.35	
IV	23.3	71.2	78.6	100.0	5.95		13.4	32.0	83.0	105.8	6.59	
1966 I	23.6	71.2	81.1	100.0	6.31		13.3	32.1	83.1	105.1	6.77	
II	24.3	74.0	82.3	99.8	6.67		13.5	32.9	84.0	103.6	7.03	
III	25.1	76.3	81.9	99.6	6.68		13.7	33.4	84.7	100.3	7.29	
IV	24.4	77.0	82.6	99.2	6.68		13.9	34.0	85.9	94.6	6.78	
1967 I	25.1	78.6	84.5	98.7	6.47		13.8	34.4	85.2	87.1	6.49	
II	26.3	80.8	85.1	98.3	6.40		14.2	34.8	86.6	85.7	6.75	
III	27.1	83.4	86.6	98.1	6.41		14.6	35.6	87.8	85.1	6.91	
IV	27.4	84.5	86.1	98.1	6.42		15.3	34.9	87.6	86.4	7.26	
1968 I	28.4	88.5	88.3	98.2	6.48		15.0	36.4	87.9	91.8	7.29	
II	30.0	88.6	88.4	98.4	6.48		15.6	36.7	88.6	96.7	7.60	
III	31.5	90.1	89.2	98.6	6.56		15.7	38.3	90.9	101.4	7.63	
IV	31.3	94.4	91.0	98.8	6.56		16.4	38.3	91.0	106.6	8.09	

Table A.1 (*continued*)

		The Netherlands (billions of Fl.)						United Kingdom (billions of £)					
		$M2$	Y	p 1970=100	$c1$	r %	r_s %	$M3$	Y	p 1970=100	$c1$	r %	r_s %
1969	I	32.2	97.2	93.5	98.9	6.91		16.1	38.3	91.1	111.9	8.77	
	II	33.8	101.9	95.2	99.0	7.36		16.0	38.9	92.0	110.6	9.55	
	III	35.2	102.7	95.4	99.1	7.75		16.2	40.0	93.4	109.7	9.37	
	IV	34.7	108.0	95.1	99.2	7.87		16.9	40.6	94.7	108.7	9.15	
1970	I	35.5	108.1	98.2	99.3	7.99	8.51	16.5	41.3	96.6	106.4	8.75	9.26
	II	37.9	114.3	99.0	99.4	8.13	8.24	17.2	42.7	98.3	105.0	9.58	8.18
	III	39.3	116.4	101.1	99.4	8.02	7.70	17.6	44.0	101.4	104.6	9.28	7.56
	IV	38.5	121.4	101.7	99.5	7.91	7.37	18.5	45.8	103.8	103.3	9.62	7.27
1971	I	39.1	124.8	104.5	99.4	7.56	5.84	18.5	46.1	105.7	98.4	9.07	5.16
	II	40.9	127.9	106.6	99.2	7.50	4.60	19.0	47.9	108.1	92.6	9.08	6.56
	III	41.7	132.8	109.5	98.9	7.68	5.02	19.5	50.9	113.0	87.7	8.50	5.85
	IV	41.6	134.7	113.4	98.5	7.76	5.58	20.9	52.1	116.2	85.3	8.10	4.78
1972	I	42.0	141.8	116.1	98.1	7.37	4.03	21.4	52.5	116.9	86.3	8.16	5.02
	II	44.7	144.5	117.5	97.7	7.48	2.45	23.1	53.7	119.9	90.4	9.32	5.78
	III	46.6	148.3	119.5	97.5	7.25	1.35	24.1	55.4	123.9	93.4	9.54	7.86
	IV	[illegible]	154.8	121.7	97.5	7.32	4.03	26.2	58.3	127.0	99.9	9.62	8.54
1973	I	48.2	165.4	125.0	97.6	7.38	3.54	27.1	62.9	126.9	109.1	9.62	10.23
	II	52.1	167.6	127.8	97.7	7.55	3.76	28.7	62.2	128.1	115.6	10.01	8.94
	III	54.0	168.1	130.7	97.7	8.29	[illegible]	31.0	64.5	132.3	118.7	10.15	13.13
	IV	55.9	175.9	131.6	97.7	8.45	11.15	33.5	66.2	137.6	113.3	11.55	14.73
1974	I	58.8	181.8	134.0	97.5	9.32	10.80	33.9	66.2	140.5	99.0	13.68	15.54
	II	64.2	191.4	137.9	97.2	10.05	10.33	34.9	70.5	146.0	111.3	14.38	13.29
	III	67.8	196.6	144.4	96.8	10.44	11.41	35.7	77.9	158.8	105.9	14.95	12.58
	IV	67.9	196.6	145.9	96.3	9.49	8.84	37.7	80.4	168.9	103.2	17.18	12.31
1975	I	68.6	199.8	151.8	95.7	8.86	7.72	37.4	85.4	182.9	98.3	13.43	10.87
	II	73.1	206.6	155.9	95.3	8.59	4.50	38.2	90.6	190.7	90.6	14.41	9.86
	III	73.0	209.0	157.4	94.9	8.89	3.60	39.6	94.2	201.2	88.3	13.79	10.54
	IV	71.9	220.6	159.0	94.7	8.82	5.24	40.6	99.8	210.3	89.7	14.79	11.15
1976	I	74.8	227.1	164.7	94.6	8.35	3.86	40.5	103.8	213.8	88.1	13.88	8.91
	II	80.6	231.5	169.1	94.6	8.81	4.45	42.3	107.1	220.8	91.9	14.09	10.87
	III	85.1	245.3	171.5	94.7	9.82	10.92	44.3	111.3	227.1	94.6	14.79	11.75
	IV	88.2	248.2	173.6	94.7	8.83	8.31	45.1	115.8	235.2	98.3	15.58	14.75
1977	I	91.7	251.7	175.2	94.8	8.36	5.82	44.4	116.7	240.0	101.3	13.25	11.96
	II	96.2	259.5	181.2	94.9	8.13	3.48	46.5	120.5	244.7	100.4	13.26	8.06
	III	92.2	266.3	185.5	94.9	7.82	3.49	47.3	126.4	253.5	98.4	11.88	6.96
	IV	90.1	269.1	185.7	94.8	8.09	5.46	49.6	130.0	257.9	96.9	11.16	5.74
1978	I	93.7	271.7	185.8	94.7	7.58	5.15	50.9	134.3	266.8	99.8	11.72	6.65
	II	98.4	281.4	188.5	94.6	7.34	4.59	53.3	138.4	270.2	101.0	12.79	8.97
	III	98.5	285.3	191.0	94.4	7.75	6.26	54.3	148.0	286.0	102.8	12.64	9.68
	IV	96.1	289.9	192.7	94.3	8.27	10.16	57.0	145.4	284.0	104.6	13.22	11.64

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